Getting Started

Bluetooth Application and Training Tool Kit
LZT 108 4123 R1A
History

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1. License for the Bluetooth Application and Training Tool Kit from Ericsson

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2. General

2.1 Introduction

The Tool Kit is a product for development and/or demonstration purpose only and it has not been qualified to the Bluetooth specification. Qualification for the Tool Kit is based upon a declaration of compliance with the Bluetooth Specification 1.0B and Brand Book.

The Bluetooth device on the Tool Kit is an engineering sample with no guaranteed specifications.

On this version of the PC Host Reference Stack, only USB communication is implemented as the HCI transport layer. The supply current for the Bluetooth Module is through the USB cable.

However, also the UART transport layer is supported by the Bluetooth Module, which means that you can send HCI commands between the host PC and the Tool Kit (with another host software) through two UARTS. In this case the communication is assumed to be free from line errors. RTS/CTS flow control has to be used. The first decoded HCI command received by the Bluetooth module through either of the USB or UART ports determines which port to be selected. The other one is switched off, until next hardware reset.

Source code supplied with the Tool Kit should be seen as an example with no warranties regarding fitness for any particular purpose.

2.2 Host platforms

The PC Host Reference Stack requires Win 98 (ed. 2) or 2000 environment because of the USB support.
This version of the Bluetooth Module requires a PC hardware with the Intel USB Universal Host Controller. To check how the PC is equipped, right-click My Computer and find the System Properties window under properties (Win 98). Select Device Manager and look under Universal Serial Bus Controllers.

2.3 Support

Sigma ComTec AB
Stortorget 9
SE-211 22 Malmö

E-mail: info@comtec.sigma.se
Internet: http://www.comtec.sigma.se
3. Package Contents

3.1 Main components

- Tool Kit board with connectors for USB and RS232
- Complete with Bluetooth Module and on board inverted-F antenna.
- Type A to Type B USB Cable
- 9 way female to female RS232 cable
- RS232 cable adapter
- CD_ROM including:
  - A PC ported executable of the Bluetooth Reference Host Stack with a few demo applications. This software contains selected higher layers of the Bluetooth protocol stack (HCI-Driver, L2CAP, SDP and RFCOMM), together with a uniform interface and some sample applications. It allows the user to focus on the application level and system aspects of his Bluetooth solution.
  - Bluetooth USB driver
  - Documentation of the application software interface.
  - Datasheet of the Bluetooth Module
  - Overhead presentations
  - Bluetooth Specification
  - Bluetooth Web-learn program information

3.2 Overhead presentations

A general Bluetooth presentation suite is available on the CD. All files are in PDF format except the “agenda” which is in PowerPoint format. The agenda has links to all the provided PDF files.

All presentation files are stored on the CD in the directory “Bluetooth Presentations”

The following files/presentations are provided:

- Agenda (PowerPoint)
- Introduction (PDF)
- Architecture overview (PDF)
- Profiles (PDF)
- Qualification (PDF)
- Radio and baseband (PDF)
3.3 Bluetooth Weblearn Program

*Bluetooth, a Technical Introduction*

The Bluetooth Application and Training Tool Kit allows you to access the Bluetooth weblearn program.

This course provides a technical overview and a comprehensive introduction to Bluetooth - the universal radio interface in the 2.4 GHz frequency band that enables portable electronic devices to connect and communicate wirelessly via short-range, ad hoc networks.

**Contents:**

- Course Introduction
- Technical Features & Architecture
- Topology
- Physical Channels and Links
- Packet Formats and Packet Types
- Logical Channels
- Timing & Synchronisation
- Access Procedures
- System Operation
- Security
- Course Summary
- Course Quiz

Note: You need the Macromedia Flash 3 plugin to take this course. You can download it at: [http://www.macromedia.com/shockwave/download](http://www.macromedia.com/shockwave/download)

Please use the username and password at the back of this document to get access to the course.
4. Circuit board description

The hardware consists of a two-layer printed circuit board equipped with a UART buffer, a voltage regulator, a few passive components and the Bluetooth Module of Ericsson. This Bluetooth Module includes the Ericsson Baseband device, a Flash Memory and the Ericsson Radio Module device.

For technical details of the Bluetooth Module please look in the datasheet rok101007.pdf included on the Tool Kit CD.

![Bluetooth Module Diagram]

Figure 2: The Tool Kit circuit board

To make easy access possible to certain signals, a jumper area is included on the Tool Kit. The jumper area is listed in the table below. Note that pin 1 is at the edge of the board next to the reset switch.

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<tr>
<td>2</td>
<td>PCM_CLK</td>
<td>4</td>
<td>PCM_SYNK</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>Vin 5V nom</td>
<td>3</td>
<td>WAKE_UP</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>DETACH</td>
<td>10</td>
<td>GROUND</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>RESET</td>
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5. Bluetooth PC Reference Stack

The Bluetooth PC Reference Stack is a PC ported version of the Bluetooth Host Stack, which is a software component developed by Ericsson to enable local wireless connections between devices such as mobile computers, handheld units, mobile phones, LAN access points, digital cameras headsets etc. This Bluetooth Host Stack is independent of operating system and hardware.

The Bluetooth PC Reference Stack communicates with the Bluetooth Module from Ericsson via the HCI interface, which is standardized by the Bluetooth Special Interest Group.

The Bluetooth Host Stack complies with the Bluetooth Specification and will be used in many Ericsson products.

Documentation of the interface and the functionality provided by the Bluetooth PC Reference Stack and the set-up procedure is included in the separate document “BT PC Ref UsersManual.pdf”.
6. Bluetooth PC Reference Stack Applications

There are two sample applications with source code on the Tool Kit CD. The source code is designed to work with Microsoft Visual C++. It has only been tested with version 6.0. If you are using a different compiler like an older version of MS Visual C++ or another compiler you have to notice that some parameters have to be changed to compile correctly.

How to use the Bluetooth PC Reference Stack applications is explained in the next chapter. The progress through the chapter will be explanations in a 'step by step' manner on how to set-up, configure a pair of devices and run the sample applications.

6.1 Software contents

- A sample application that demonstrates connect/disconnect of a headset profile.
- The source code of the connect/disconnect sample application.
- A sample application that demonstrates a chat application.
- The source code of the chat sample application.
- COM server that includes the Bluetooth PC Reference Stack
7. To run the Bluetooth PC Reference Stack

7.1 USB driver installation

After installing the Tool Kit software in a suitable directory, the USB driver has to be installed.

There are basically two ways to install the USB driver:

- Connect the Tool Kit to the USB port of the computer. The operating system will start the Add New Hardware Wizard (The factory installed jumper between pin 8 and 10 on the board JP2 is necessary).

- Go to the Control Panel and select Add New Hardware.

Follow the instructions of the wizard. Select “No, I want to select the hardware from a list”.

Select Universal Serial Bus Controllers:
Select Have Disk:

Enter the path to the driver files ebtusb.sys and ebtusb.inf in your Bluetooth Toolkit directory. Press OK.....

....and the new driver will appear:

Press Next and Finish and the driver should be installed.
The driver should be loaded by the operating system when the Tool Kit is connected to the computer's USB port. The driver should be found under Universal Serial Bus Controllers in the Device manager (Win 98).

### 7.1.1 USB driver warning

The USB cable should not be unplugged and the reset button for the Bluetooth Module should not be pressed when a program is using the USB port, otherwise you may have to reboot your PC.

### 7.2 COM Server

This program is automatically installed. You will see the dialog box below when you run `"<bt-executables path>Bt_comserver.exe /RegServer"`.

When you type `"<bt-executables path>Bt_comserver.exe /UnRegServer"`, the following dialog will appear:

![Bluetooth COM Server dialog]

NOTE! If the BT_COMServer.exe crashes, you have to reset your Bluetooth device by pushing the reset button on the device before a new attempt to connect. You should also restart the applications to be sure that they run properly. In BT_Chat, BT_ChatServer.exe is hidden during the connection procedure so you'll have to use Task Manager.

### 7.3 Sample applications

There are two sample applications provided with the CD-ROM. One is BT_TestSample and the other is BT_Chat. These applications are clients to COM Server application (BT_COMServer.exe). Please refer to the COM technology for extensive explanations of COM environment. Both applications utilize client/server solution when they demonstrate a Bluetooth communication connection. Before running any application you have to be sure you have already set-up the environment properly and that you use two computers, each connected to it's own Bluetooth device.
NOTE! You can’t use a shared folder to run both client and server applications on the same COMServer.exe. They have to run on different computers, because the COM Server does not support multipoint connections.

The Test Sample

The Test Sample application demonstrates a connection between a Bluetooth master device and a slave Bluetooth device. The connection makes use of a headset profile. The application connects and disconnects repeatedly with a few seconds cycle time. The BT_TestSample has three parts, the BT_TestSampleSecurity, the BT_TestSampleServer and the BT_TestSampleClient.

7.3.1.1 How to run BT_TestSample

Follow these steps:

Make sure that the COM Server and the Bluetooth device is set-up correctly. Simply start BT_TestSampleSecurity.exe on both computers.

If a dialog looking like the one below appears then the COMServer.exe isn’t registered.

To take care of this problem you have to:

Check in the task manager for a process called BT_COM~1.exe or BT_COMServer.exe and end the process.
Hardware reset the Bluetooth device
Run “<bt-executables path>Bt_comserver.exe /RegServer”

If you see the dialog below,

you have to restart BT_TestSampleSecurity.exe on both computers.

Finally you start BT_TestSampleServer.exe on one of the computers and on the other you start BT_TestSampleClient.exe.
7.3.1.2 What does BT_TestSample demonstrate?

BT_TestSample demonstrates a connection between two Bluetooth devices communicating on a radio channel that is configured with a headset profile. It opens and closes the channel repeatedly.

The graphical user interfaces (GUI) is kept simple and shows only the necessary parameters to view the connection attempts that is made between the both devices.

Below you can see the GUI of both BT_TestSampleClient and BT_TestSampleServer.

When the channel opens the following happens:

1. BT_TestSampleClient sends an inquiry with the destination device address typed in the edit box.

2. If it discovers the device that was inquired, it asks the server what kind of profiles are offered. In this case there is only the headset profile available.

3. After that the client acquires the profile through SDP-stack services.

4. The information that was fetched is used to configure a common communication channel using RFCOMM-stack.

5. Then some packets of voice data are exchanged. Finally it disconnects.

The steps 1 to 5 are repeated over and over again.
7.3.2 Chat

The Chat application demonstrates a connection between a Bluetooth master device and a Bluetooth slave device. The connection makes use of a chat profile. The application’s task is to set-up a chat channel between the two devices. BT_Chat is made of three parts, the BT_ChatSecurity, the BT_ChatServer and the BT_ChatClient.

7.3.2.1 How to run BT_Chat

Follow these steps:

Make sure that the environment is set-up correctly according to previous description.

Simply start BT_ChatSecurity.exe on both computers.

If a dialog looking like the one below appears, then the COMServer.exe isn’t registered.

```
Error
No Instance Created
```

To take care of this problem you have to:

Check in the task manager for a process called BT_COM~1.exe or BT_COMServer.exe and end the process.

Hardware reset the Bluetooth device.

Run “<bt-executables path>\BT_comserver.exe /RegServer”.

When you se the dialog below,

```
Bluetooth COM Server
BT_COMServer is registered successfully
```

you have to restart BT_TestSampleSecurity.exe on both computers.

Finally you start BT_ChatServer.exe on one of the computers, and on the other you start the BT_ChatClient.exe.
7.3.2.2 What does BT_Chat demonstrate?

BT_Chat demonstrates a connection between two Bluetooth devices communicating on a radio channel that is configured with a chat profile. Before it sets up a channel for chatting purposes, it also shows various preparations. It makes for instance inquiry of devices and asks for profiles (services) provided by the server side (SCM and SDP do this). To end the chat application just push “End Chat”.

The GUI is not more complex than the one for the BT_TestSample. Below you can see the GUI of BT_ChatSecurity, BT_ChatClient and BT_ChatServer.

To start-up a chat session you have to do the following steps:

1. Start-up BT_ChatSecurity (Bluetooth neighbourhood) on both computers.
2. Choose one of the computers to act as server. Start BT_ChatServer on the server.
3. Push “Get Devices”-button (see pic. # 1. above) on the client computer.
4. Wait until “Select Devices”-button (see pic. # 2. above) becomes available (may take 10 seconds) and then select the desired device in the list box, if there is any, on the right next to the button. Then press the button.
5. In the “Services”-frame on the dialog address and name will be set.
6. Get profiles from the remote device by pressing “Get-Services”-button (see pic. # 3. above). They will be listed in the list box next to the button.
7. Select the profile in the list box and push “Select Services”-button (see pic. # 4. above) to initialise the client stack with the acquired profile.
8. Now you are ready to start the BT_ChatClient on the client computer by pressing the “Connect”-button (see pic. # 5. above).

And below you can see an example of a chat session in action.
7.4 The source code of the sample applications

The source code is located in the following directory structure:

```
Program Files
  Bluetooth PC Reference Stack
    BT_Chat (NT and Win 2000)
    BT_Chat (Win 98)
    BT_TestSample (NT and Win 2000)
    BT_TestSample (Win 98)
    doc
    exp
    lib
```

All executables are stored here.

```
Program Files
  Bluetooth PC Reference Stack
    BT_Chat
    BT_TestSample
    doc
    exp
    lib
```

```
BT_Chat
  exe
  project
    client
    security
    server
  sw
  client
  security
  server
```

```
exe
project
  client
  security
  server
  sw
  client
  security
  server
```

All executables are stored here.

Chat client project
Chat security project
Chat server project
Chat source
Chat client source
Chat security source
Chat server source